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Characteristics of Home and Neighborhood Built Environments During COVID-19 for Older Adults in the United States and Italy

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Abstract

The home and neighborhood environments impact the social and mental health of older adults, yet little research has addressed the various contexts that can affect these relationships, such as community culture, built and natural elements, and demographics. This survey-based study examined community-dwelling older adults' access and use of transitional outdoor/indoor space (i.e., porches, gardens, windows, etc.), and how that use was related to health variables and changed with the pandemic in two available samples of older adults in the United States and Italy. Use of both outdoor and indoor space was found to be more individualistic in Boston, in the United States, than in Chieti, Italy, where use of these areas with others was more common. Results suggest that window viewing from within the home may be an activity that individuals in Italy engage in when feeling lonely. Changes in the use of home and community space after COVID-19 were minimal; only in the United States did individuals report greater time indoors since the onset of the pandemic. Use of the built environment in and around the home by older adults was found to have multidimensional characteristics between the United States and Italy, with the potential to foster connections and improve well-being.

Keywords

Architecture; COVID-19; cross-cultural differences; evidence-based design; geriatrics; social and mental health; transitional space

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Introduction

The social determinants of health and their impact on the health and social care needs of older adults are well documented (McGilton et al., 2018; Perez, 2022). The built environment has been increasingly recognized for its impact on health outcomes. While historically this research has been focused on institutional settings (Ulrich et al., 2008), more recent studies in community dwelling individuals have demonstrated that built space affects mental health and social isolation (Domènech-Abella et al., 2021; Moore et al., 2018). This prior research, although important, leaves a gap in characterizing older adults' use across spatial scales that include both residential and community space, and the contexts surrounding use of space, such as culture and the COVID-19 pandemic.

Community and home architectural design processes have the potential to improve social and mental health. One such design technique includes *transitional spaces,* which are indoor/outdoor areas designed to foster connections to the surrounding world and boost well-being—considered essential anchors of community life (Granger, 2021). At the community level, they include spaces such as parks, outdoor seating, and so on. While these neighborhood built-environment factors can offer individuals opportunities for physical activity as well as social engagement, access may be more difficult for older adults due to health impairments (Levasseur et al., 2015). However, residential transitional spaces such as porches, yards, and even windows can also serve as physical and social links.

For older adults who increasingly stay in the home—whether due to physical and/or cognitive impairments, or by choice—these transitional spaces may allow ways of engaging with the surrounding social landscape (Kleeman et al., 2023; Maas, 2009). In addition, the detrimental effects of forced social isolation (i.e., due to either immobility or COVID-19 pandemic restrictions, etc.) can be mitigated through transitional space design features already accessible within the home, including windows in frequently used spaces (Leccese & McCormick, 2000; Rowles, 1981). While transitional spaces often include natural environment features, there are also built features to consider, and contextual aspects of community culture and demographic features of those using the spaces.

The aim of this research was to broadly characterize access and use of transitional spaces in and around the home in a diverse sample of older adults from available sites. The cities were chosen based on a prior collaboration between two authors of this study (AEB and RP). Though some limitations are inherent in using available samples (e.g., as compared to stratifying a priori), we hoped that testing in these different locations could shed light on cultural differences, as cross-national aging research is limited (Nichols et al., 2023). Specifically we examined community-dwelling older adults' use of transitional outdoor/indoor space (i.e., porches, gardens, windows, etc.), and how that use was related to health variables and changed with the pandemic.

Background

Community transitional spaces

The relationship between social well-being (e.g., the degree of loneliness and social isolation), mental health (e.g., the degree of depressive symptoms, anxiety), and the built environment context has been well documented. Outdoor community spaces that incorporate nature (i.e., “green space”) have been shown to be beneficial for older adults in terms of psychological restorative effects (Qiu et al., 2021). There is some recent evidence from Florence, Italy, to suggest that urban green spaces can promote social cohesion (Chiesi & Costa, 2022). A study involving two large datasets in the Netherlands found that the amount of green space in the living environment correlated with reduced feelings of loneliness and perceived social support, specifically for older adults, children, and people with a lower economic status (Maas, 2009). In western Canada, green spaces were reported by low-income older adults to be essential for community interactions and social well-being (Finlay et al., 2015). A lower incidence of loneliness was found in Australia for those with green space close to their home, especially for those living alone (Astell-Burt et al., 2002). Social contacts have been proposed as an underlying mechanism behind the relationship between green space and health (Maas, 2009).

For individuals with low socioeconomic status, the presence of tree-lined streets around the home significantly reduced their likelihood of taking antidepressants, suggesting that unintentional exposure to green space may lower the risk of depression (Marselle et al., 2020). Living close to natural environments also contributes to better physical functioning at older ages. Residential proximity to green spaces and water has been associated with slower decline in walking speed and grip strength in older adults, where the associations with decline in physical functioning were in part enabled by social functioning and mental health (de Keijzer et al., 2019).

Prior literature showed that time spent in outside space is important in terms of cumulative time per week, more so than type of space (e.g., parks, wooded areas, alongside water, etc.) or activity (e.g., sitting passively versus physical activity) and how that time limit is reached (e.g., fewer longer periods or several shorter ones) (White et al., 2019). Therefore, this study focuses on use of space reported by participants, with data collapsed across use of public spaces, since it has been shown in prior papers that time spent is associated with health benefits (e.g., physical health such as blood pressure, mental and social well-being) (Akpinar et al., 2016).

Although green space has known importance for well-being, community built space also has health implications. The “neighborhood disorder model” suggests that markers of physical (e.g., empty buildings, vandalism, etc.) and social disorder (e.g., disruptive noise from neighbors) cause depressive symptoms to increase (Truong & Ma, 2006). Neighborhood characteristics that may contribute to depression in community dwelling older adults from four different regions of the United States included traffic safety, crime, social capital, and density of businesses (Ivey et al., 2015). Recent shifts toward single units and large vertical towers are thought to contribute to increased loneliness (Drury, 2014). In a recent Australian study of apartment dwellers, those who had poorer perception of their outdoor

communal areas reported fewer social interactions with others, and those who did not use the indoor communal spaces were more likely to report feeling lonely (Kleeman et al., 2023). Importantly, this prior research on built space has focused extensively on its negative impacts, leaving open the question of what features of built space, if any, can have a positive impact.

In addition to how the built space may affect health broadly, more recent research has begun to identify specific contexts that can impact these relationships. A recent scoping review found a positive impact of actively using green space (including public parks and private home gardens) on physical and mental health within the context of the COVID-19 pandemic (Heckert & Bristowe, 2021). Specifically, indoor and outdoor green spaces may be associated with fewer depressive symptoms during the pandemic's home restrictions (Zhang et al., 2023). Several recent European studies have noted the impact of nature during the COVID-19 pandemic for a variety of age groups. For example, in Bulgaria, students who spent most of their time at home during the pandemic experienced better mental health when exposed to more greenery (Dzhambov et al., 2021), while older adults in Scotland who spent more time in the garden during COVID-19 lockdown reported significantly better physical health, emotional and mental well-being, and sleep quality (Corley et al., 2021).

Research on the effects of greenery in urban contexts has several limits. Taylor and Hochuli (2017) have noted a tendency of prior studies to refer to ambiguously defined green spaces, where natural vegetation may be present in significantly different amounts. While prior research has emphasized green and blue space in terms of health benefits, data are lacking on characterizing community and home transitional spaces that combine both natural and manmade elements (i.e., landscaped parks with hardscape in addition to nature, etc.). In addition, literature documenting whether the use of transitional spaces (both community and home) changed during the pandemic is limited. Further, potential variations in use of these spaces between geographic regions remain largely unexplored, despite the importance of these differences in older adults' health (e.g., Nichols et al., 2023).

In addition to nature and built features, people's engagement with outdoor transitional spaces includes other complex factors such as social, demographic and cultural components. Prior research has noted that older adults are generally less likely to explore outdoor public spaces due to physical limitations, and are less likely to engage in social interaction when compared to younger adults (Askari, 2015). In addition, inequities in access, amenities, and perception of safety of outdoor transitional spaces could further exacerbate differences in access, use, and potential health benefits (Lopez, 2021). There is also the need for more cross-cultural comparisons, as much of the previous research has been limited to comparisons between home use of Eastern versus Western societies. Some limited work has also shown that when populations migrate, they bring their cultural use of space with them. For example, Puerto Ricans who move to northern climates bring with them use and focus on spaces like open markets. Clearly, this limited research has established cultural differences in use of built space either between locations or within a given location; however, more research is needed.

Home transitional spaces and window views

While neighborhood built-environment factors (e.g., outdoor community seating space with nature) can offer individuals opportunities for physical activity as well as social engagement, not all individuals have access to these factors or would be inclined to use them. The home environment has been shown to support or constrain a healthy aging process and quality of life, whereby older adults adapt activities and draw on past experiences within the space to meet their changing needs (Sixsmith et al., 2014). Indeed, many private transitional spaces in and around the home (such as house porches and windows) may offer similar benefits to health. For example, in a prior study of older Hispanic adults in the United States, housing features such as front porches that promoted visibility and face-to-face interactions from a home's exterior were positively associated with higher levels of perceived social support variables (Brown et al., 2009). With regard to architectural parameters, Amerio et al. (2020) found that students with moderate–severe and severe depressive symptoms were more likely to live in apartments with an unusable balcony. Ultimately, while the presence of such features are important, whether or not transitional spaces are actually used is an important consideration.

More research suggests a particular benefit of window views that feature nature. Such views can reduce stress, reduce medication use, and allow a faster surgical recovery in the hospital setting (Ulrich, 1984). Additional studies have found benefits of window views to natural settings in the hospital space (Ulrich et al., 2008; Verderber, 1986) and in a residential rehabilitation center (Raanaas et al., 2011). While window data exist with particular emphasis on green views, further understanding of these views from within the home that include man-made elements is still lacking. Prior research has demonstrated the health benefits of nature views from home windows in terms of a lower risk of anxiety or depressive symptoms (Braçe et al., 2020; Dzhambov et al., 2021; Pouso et al., 2020; Soga, 2021), improved life satisfaction (Chang et al., 2020), and overall enjoyment from the social and nature connectedness (Musselwhite, 2018).

In addition to observation of nature, window views have been documented to carry social importance for the older adult population. Simply looking out the window is important to older people (Dowds, 2018), and prior research has noted the importance of windows in allowing connections to the outside through watching and viewing outside activities from within the home (Rowles, 1981). Rowles (1981) noted the "surveillance zone," the area immediately outside older people's homes whereby they can watch their neighborhood from their window and can participate in the community without having to literally be in it. While Leccese and McCormick (2000) suggest that buildings with windows close to the street or other public space allow neighbors to look out for each other, they found that windows related to perceived social support in the opposite direction of what was predicted—older adults with greater proportions of window area reported lower levels of social support. The authors postulate that older buildings are most likely to be associated with higher levels of perceived social support due to features such as porches that increase face-to-face interactions, whereas windows remove this in-person proximity.

However, it is important to note that window views have not always been found to be favorable. In one study, window areas that promoted visibility from a home's interior were

negatively associated with perceived social support, thought to be due to reduced contact with others, despite allowing for observation of surrounding community activities (Brown et al., 2009).

Despite this, window views may be particularly important in the context of the COVID-19 pandemic where many people encountered stay-at-home requirements (Soga, 2021; Amerio et al., 2020). The pandemic resulted in older adults spending more time in their homes with fewer social interactions and increased social isolation (Kotwal et al., 2021). The utilization of existing home built-environment features (i.e., green views from home) to improve health during the pandemic has been noted in a spectrum of age groups (Amerio et al., 2020; Spano et al., 2021). A recent survey of 3,000 residents during the pandemic in Tokyo found that the frequency of greenspace use and the existence of green window views from within the home were associated with increased levels of self-esteem, life satisfaction, and subjective happiness and decreased levels of depression, anxiety, and loneliness (Soga, 2021). A Web-based survey administered to students in Milan, Italy (an area significantly impacted by the pandemic in Europe), showed that during lockdown periods, poor housing was associated with increased risk of reported depressive symptoms. In particular, living in small apartments with limited views and poor indoor quality (including factors such as natural light, acoustics, greenery, etc.) was associated with the risk of depressive symptoms (Amerio et al., 2020). Clearly, window viewing can impact health across geographic regions. Determining any differences between such regions is an important next step.

This study builds on previous observations in two ways: We sought to outline cross-culture variations in terms of transitional space use, access, and characteristics for this age group, and to characterize transitional spaces beyond their natural elements (e.g., most frequently used indoor areas and activities undertaken, etc.). In addition to transitional space and use characteristics in two countries, this study seeks to describe whether time and space use of outdoor and indoor transitional spaces changed for older adults due to the COVID-19 pandemic.

Methods

Study setting and participants

The present cross-cultural survey-based study comprised community-dwelling older adults (≥60 years). Participants were recruited from two sites: (1) Boston, Massachusetts, a metropolitan city located in the Northeast region of the United States with a population of 654,776 as of 2021, including 11.8% persons ages 65 years and over (US Census Bureau, 2022) and a density of 13,977 persons per square mile, and (2) Chieti, Italy, a small city in the Abruzzo region of Italy with a total population of 48,612 as of 2022 with 27.7% older adults (≥65 years) and a density of 2,200 persons per square mile (Brinkhoff: City Population, 2023). The choice of cities was related to this study being part of a larger research protocol already recruiting from Boston and Chieti, entitled “Impact of remote social interaction during the COVID-19 pandemic on the cognitive and psychological status of older adults with and without cognitive impairment” (clinicaltrials.gov: NCT04480112).

Boston's urban setting is close to the Atlantic Ocean coastline, with the residential space comprising single-family homes and multifamily buildings with several units (Metropolitan Area Planning Council: Boston Housing, 2023). Balconies are sometimes provided in apartments. Communal gardens are commonly seen (see Figure 1). Chieti is situated in close proximity to the Adriatic Sea and is right below the Apennine Mountains. The majority of people live in apartment-style residential buildings, some with common green space, although the city is close to natural outside spaces (seaside and mountains). Most apartments have a small balcony. The old town sits at a higher elevation, while the newer part of the city is below, with walkable paths, parks, and piazzas (see Figure 2).

Participants from the Boston cohort were recruited from two sites, including a tertiary memory disorders clinic at the Veterans Affairs (VA) Healthcare system and from volunteers who responded to advertisements at Boston University Alzheimer's Disease Research Center. Participants from Chieti were recruited from a single site and included volunteers who responded to advertisements at G. d'Annunzio University of Chieti–Pescara. The Italian participants were recruited from the community and were not recruited from a memory disorders clinic directly. For this reason, we have used the blind Montreal Cognitive Assessment (MoCA) as a screening measure for cognitive impairment that could be used across the sites within the two countries.

Individuals were included in the study if they were 60 years old or older, had access to a telephone for remotely administered surveys, and included a range of cognitive abilities; see the "Cognitive screening" section and Table 1. Participants were excluded if they could not understand the informed consent due to moderate or severe cognitive impairment, or if there was any self-reported sensory impairment present (e.g., vision and hearing ability) that would impair the ability to participate in the study. None were excluded on this basis.

Data collection

Individuals in Boston ($n = N = 40$) and Chieti ($N = 51$) were administered the surveys from June 2020 to June 2021. Regarding the ability of participants to complete the data collection tools, all surveys were administered in either the English or Italian languages. Hearing ability was assessed to ensure the telephone interface would be appropriate. All subjects completed the reporting once started. Survey administration was done remotely by telephone over several sessions in order to limit participant fatigue. The assessments gathered information including age, living arrangement, marital status, level of education, health variables (e.g., mobility impairment, sensory impairments, comorbidities), a standard and validated cognitive screening measure, a social-mood battery, and a newly developed built environment survey. Participants were asked to self-report any assistive devices with respect to their mobility (e.g., walker, wheelchair), hearing (hearing aids), and vision (e.g., glasses). The built environment survey assessed both community and home design features and their uses (e.g., windows, porches). Phone sessions did not last more than 45 minutes each, separated by a median of 7 days. To reduce participant burden, surveys could be distributed in different orders across each session. If the circumstance arose where participants may have moved to a new residential location since completing the initial

survey, we asked that they report the built environment characteristics as they were at the time they were initially evaluated.

Ethics

The study was approved by the Boston University Medical Center Institutional Review Board (IRB), the Veterans Affairs (VA) Boston Healthcare System IRB, and the Ethical Committee of the Department of Psychological, Health and Territorial Sciences, University "G. d'Annunzio." All participants provided informed consent.

Measures

Cognitive screening—The neuropsychological testing included the Montreal Cognitive Assessment (MoCA; Nasreddine et al., 2005), in its blind version administered via telephone (Pendlebury et al., 2013). The MoCA is a rapid screening instrument for cognitive impairment with a total of 30 points. The blind MoCA (MoCA-B) excludes items that need to be seen, leaving a total of 22 points, with scores of 17 or below indicating some form of cognitive impairment (i.e., can range from mild cognitive impairment to mild dementia).

Social-Mood Battery—The social-mood battery included the Lubben Social Network scale (LSNS-6; Lubben et al., 2006), the UCLA Loneliness scale (Russell et al., 1978, 1980), the Geriatric Depression Scale (GDS; Yesavage & Sheikh, 1986), and the Geriatric Anxiety Inventory (GAI; Pachana et al., 2007). The GDS is a self-report measure of depression in older adults; we used the 15-item version where scores of 5 and above indicate increasing severity of depression. The GAI is a 20-item questionnaire designed to assess anxiety symptoms in older adults in which a score of 9 or above is suggested to show an anxiety disorder. The Lubben Social Network Scale (LSNS-6) is a 6-item version of a widely accepted, validated scale for measuring risk of social isolation. Scores can range from 0 to 30, with lower scores indicating greater risk of isolation. The UCLA Loneliness scale is comprised of three items measuring three dimensions of loneliness, including relational connectedness, social connectedness, and self-perceived isolation. A high score on this scale indicates greater risk of loneliness.

Built environment measures—To measure the built environment, a Transitional Spaces Survey (TSS) with open-ended questions was developed in the context of this study and used for the first time. It included a 33-item questionnaire that was used to gather more information regarding participants' homes and the surrounding communities where they live. The survey explored the difference in how participants used these spaces before the COVID-19 pandemic compared to their current use during the pandemic. The survey comprised two parts: (1) outdoor home and surrounding community access (Q1–5) characteristics and use pre/post pandemic (Q6–16), and (2) indoor room characteristics and use pre/post pandemic (Q17–33). Questions included multiple choice, rating scales, and open-ended questions (see Appendix 1 for full TSS survey tool). In the instances of closed-ended questions where individuals could choose "other" from a list of answer choices, individual responses within this category were not included. However, the truly open-ended questions (Q8b, Q11g, Q13, Q14, Q16b, Q21b, Q23b, Q25b, Q26b, Q27g, Q29, Q30, Q33b), which assessed number of trees visible from outdoor and indoor spaces, why

window coverings may remain closed, and elements enjoyed/not enjoyed about outdoor and indoor spaces transitional spaces and so on, are included in the Supplement. Of note, free text answers from the Chieti sample were translated from Italian to English.

In terms of window-viewing frequency, participants could respond with choices, including *never, rarely, occasionally, frequently, most of the day*. For data coding purposes, the response categories of *most of the day* and *frequently* were consolidated as *frequent* window viewing, and *never*, *rarely*, and *occasionally* were coded as *infrequent* window viewing.

Perceived risk measure—A risk perception scale regarding the COVID-19 pandemic consisting of 13 questions was administered to participants. This was adapted from a published study assessing risk perception during the COVID19 pandemic (Gerhold, 2020) (see Appendix 2). Each response was rated on a scale from 1 to 10 for a maximum score of 130, with a higher score indicating an increased perceived risk surrounding COVID-19 (e.g., transmission, financial risk, etc.).

Data analysis

Descriptive statistics were used to characterize the built environment, its access and use by participants. Descriptive data were managed and analyzed using Excel version 16.71 and SPSS version 23. A series of initial analyses compared individuals from the U.S. and Italian cohorts. These analyses included proportions, means, and standard deviations (SD) that were calculated for transitional space access, characteristics, and use. Comparisons of characteristics between the Boston and Italy groups were performed using *t*-tests when dependent variables were continuous and χ^2 tests when dependent variables were categorical.

For our analysis of health outcomes, we analyzed the relationship between outcomes (depression, anxiety, and loneliness) and access to outdoor space and frequency of window viewing, as these are the variables indicated by previous research (Pouso et al., 2021; Soga 2021) and also because these variables met the statistical assumptions required for analysis. While qualitative research is an important part of built environment studies (Amaratunga et al., 2002; Mcgann et al., 2020), the open-ended responses were not included in data analysis or discussion given the low response rate by participants in addition to the large range of responses for thematic analysis.

Participant characteristics

The study sample consisted of 91 older adults, ranging in age from 62 to 95 years (M = 76.0, SD = 7.1), who completed the baseline assessment including the cognitive testing, social and mental battery, transitional spaces survey, and the perceived risk measure. Given the clear differences in the samples based on geographic region and demographics, each cohort is described separately here prior to any comparative analysis. Full participant characteristics can be found in Table 1.

In Boston, 40 participants completed the study; however, two individuals did not complete the UCLA and the Perceived Risk battery. More people reported living in a house compared to a communal living situation such as an apartment complex (N = 29, 72.5%), and more

than half reported living alone (N = 27, 67.5%). Participants reported an average of 17.15 years of education. In terms of reported independence, 33 individuals (82.5%) did not use an assistive device for mobility (e.g., cane, walker), 31 (77.5%) reported no use of hearing aids, and 13 (32.5%) no vision difficulties. Regarding health measures, MoCA-B scores within this group averaged 19.78, with eight individuals scoring below cutoff. A minority of individuals in this sample reported symptoms consistent with depression (N = 5, 12.5%) and anxiety (N = 1, 2.5%). Only two individuals were at risk of social isolation and four for loneliness. Perceived risk scores surrounding COVID-19 ranged from 4 to 48, with a mean of 25.24 (Table 1).

The Chieti sample had 51 older adults, although for 37 individuals in this group marital status was not collected. While more than half the group reported living in a house compared to an apartment complex (N = 33, 64.7%), the majority of participants reported living with others as opposed to alone (N = 38, 74.51%). An average of 11.25 years of education was reported. In terms of reported independence, 45 individuals (88.24%) did not use an assistive device for mobility (e.g., cane, walker), almost all (N = 49, 96.08%) reported no use of hearing aids, and 24 (47.1%) no vision difficulties. Regarding health measures, MoCA-B scores within this group averaged 16.44, with 30 individuals scoring below cutoff. In this sample, 20 (39.22%) reported symptoms consistent with depression and 15 with anxiety (29.41%). Seven individuals were found to be at risk of social isolation and 11 for loneliness. Perceived risk scores surrounding COVID-19 ranged from 9 to 104, with a mean of 67.0 (Table 1).

In terms of variances the two groups differed in terms of years of education: Boston reported a higher average number of years of education compared to Chieti, which is in line with expected education attainment by country (UNDP (United Nations Development Programme), 2023). Difference between the two groups in terms of reported use of hearing aids and visual difficulties was significant. Regarding health measures, MoCA-B scores were greater for Boston and lower for Chieti. Individuals in the Boston sample reported fewer depression symptoms, fewer anxiety symptoms, greater social network sizes, less loneliness, and less perceived risk surrounding COVID-19. Chieti individuals reported more depression and anxiety symptoms, smaller social network sizes, more loneliness, and a higher perceived risk surrounding COVID-19. Of note, additional analysis confirmed that the differences between cohorts in depression, anxiety, social network size, loneliness, and perceived risk about COVID-19 persisted even when adjusting for age and years of education attained (with the latter being a proxy for socioeconomic status).

Results

Public and private outdoor transitional spaces: use, access, and characteristics

As seen in Table 2, the two groups differed in the number of outdoor spaces individuals have access to including both public outdoor space ($t(54.42) = 5.46$, $p < .001$), and private outdoor space ($t(82.87) = 2.37$, $p < .020$). While individuals in Boston reported a mean of 7.3 (SD = 2.4) total outdoor spaces, the Italian participants reported fewer outdoor spaces overall (M = 4.8, SD = 1.9). Both groups reported parks or green space as the most common

type of community spaces. The majority of participants in both groups reported spending time in these public and private outdoor transitional spaces.

In terms of private outdoor transitional spaces adjacent to one's home, the Boston individuals reported a back yard as the most common private outdoor space ($N = 37$, 27%), while balconies were most frequently used by the Italian group ($N = 43$, 26%) (see Table 3). The groups did not differ in their space characteristics (e.g., size and type of space, and presence of trees), outlined in Table 3. Of note, the most frequent activity reported by Boston participants included sitting and watching outside ($N = 37$, 84%), while those in Chieti reported talking to family members as the most frequent activity ($N = 43$, 86%). The groups did not differ when asked about frequency of space use when alone, $\chi^2(2) = 1.45$, $p = .484$, but did differ in their responses to frequency of space use with others, $\chi^2(2) = 8.74$, $p = .013$.

Indoor transitional spaces: use and characteristics

As seen in Table 4, indoor spaces used most within the home setting included the living room ($N = 40$, 38%) in Boston, while the family room ($N = 51$, 22%) was most used in Chieti. One participant in Boston and seven in Chieti noted having no windows in this most used space (see Table 4). The numbers of windows reported in this space by individuals in Boston ($M = 4.1$, SD = 3.52) compared to those in Chieti ($M = 1.7$, SD = 0.90) were different. The groups did not differ in their space characteristics (e.g., size and type of space, and presence of trees), outlined in Table 3. However, there were significant differences in the view of trees from windows in indoor spaces (Table 4), $\chi^2(2) = 8.80$, $p = .012$. The groups did not differ in terms of window coverings, where the majority in each reported their presence. In terms of keeping window coverings mostly open, the groups did differ, with the majority of individuals in Chieti reporting this ($N = 43$, 95.6%) compared to Boston ($N = 21$, 67.8%), $\chi^2(2) = .14.05$, $p = .001$. The most commonly reported view for both groups was a yard or garden, followed by a brick wall/building for Chieti ($N = 8$, 18.2%) and "other" for Boston ($N = 12$, 30.8%), which included 13 people who provided answers, out of which 11 of these included some form of nature. Talking on the phone ($N = 33$, 84.6%) was the most common activity for individuals in Boston, while talking to family members was most common in Chieti ($N = 38$, 86.4%). While more individuals in Boston reported frequent window viewing on their own when compared to those in Chieti, $\chi^2(1) = 9.90$, $p = .002$, window viewing was not found to differ between the groups when utilizing the space with others, $\chi^2(1) = .296$, $p = .586$.

Transitional spaces use during the COVID-19 pandemic

Because the TSS was administered during the COVID-19 pandemic, questions were included about potential changes in access and use of transitional spaces (Table 5). The reported use and time spent in outdoor transitional spaces since the start of the pandemic did not significantly differ between the two groups. As a result, we collapsed across the two national groups and instead divided groups by *time assessed during the pandemic*. Almost half the participants completed the TSS prior to May 2021 ($N = 42$; 46.7% during October–April), while the remainder completed the TSS in May and June 2021 ($N = 48$; 53.3%). For those with complete data, the two groups, thus, formed an "early–mid" pandemic group

(N = 38) and a "late" pandemic group (N = 42). These groups differed by whether they reported "less," "more," or "the same" amount of time in outdoor space since the onset of the pandemic, $\chi^2(2) = 7.52$, $p = .023$. In the early–mid group, 47.4% (N = 18) reported the "same" and 36.8% (N = 14) reported "less" amount of time outdoors (only N = 6, 15.7% reported "more"). In the late group, 57.1% (N = 24) reported the "same" and 31.0% (N = 13) reported "more" amount of time outdoors (only N = 5, 11.9% reported "less"). Ultimately, the majority of people indicated the same use of space since the onset of the pandemic.

The reported use and time spent in indoor spaces since the start of the pandemic differed between the national groups. More individuals in the Chieti group report using indoor transitional space differently and undertaking different activities in this space during the pandemic. In addition, more individuals in Chieti reported spending the same amount of time in this indoor space during the pandemic (N = 35, 77.7%) when compared with the Boston sample (N = 18, 46.2%), $\chi^2(3) = 14.85$, $p = .002$. Furthermore, an equal number reported more (N = 18, 46.2%) or the same amount of time (N = 18, 46.2%), $\chi^2(3) = 14.84$, $p = .002$.

Secondary analyses with health measures

Total numbers of outdoor spaces were not related to mood and loneliness, for either Boston ($r_{Space\_GDS} = -.224$, $p = .165$; $r_{Space\_GAI} = -.125$, $p = .442$; $r_{Space\_UCLA} = -.190$, $p = .253$) or Chieti ($r_{Space\_GDS} = -.147$, $p = .303$; $r_{Space\_GAI} = -.156$, $p = .273$; $r_{Space\_UCLA} = .086$, $p = .549$). For Boston, people who frequently looked out the window by themselves (N = 29) did not differ from those who infrequently looked out the window (N = 10) in depression, $t(11.7) = 0.93$, $p = .370$, anxiety, $t(37) = 0.30$, $p = .769$, or loneliness, $t(35) = 0.53$, $p = .597$. For Chieti, people who frequently looked out the window by themselves (N = 20) did not differ from those who infrequently looked out the window (N = 24) in depression, $t(42) = 29$, $p = .771$ or anxiety, $t(42) = 0.23$, $p = .821$. However, people in Chieti who reported more frequent window-viewing also reported greater loneliness (M = 47.55, SD = 6.61) than did people who did not frequently look out the window (M = 40.54, SD = 8.08), $t(42) = 3.11$, $p = .003$.

Discussion

In this study we examined older adults' use of outdoor space and indoor space and how that use was related to health variables and changed with the pandemic. The TSS survey tool was developed in the context of this study and used for the first time. For individuals in our Boston sample, their use of outdoor space was individualistic, characterized by access to front and back yards and solitary activities (e.g., sitting and watching outside). For individuals in Chieti, their use of outdoor space included more talking to family members and space that was part of their building (e.g., balconies). This pattern continued for indoor space, where Boston participants reported more use of living rooms while Chieti participants reported more use of family rooms. It did not appear that this was simply a language difference, as the spaces themselves were characterized differently in terms of both composition (e.g., number of windows) and activities performed. In addition, because apartment buildings are prominent in Italian cities (Signorelli, 2020), the increased use of

balconies reported by the Chieti cohort could also be due to the fact that they were more likely to have balconies accessible from their immediate home.

No differences were present as to how often people looked out their windows with others. Individuals in Boston reported frequently looking out of their windows alone, whereas for people in Chieti, half of our sample did not frequently engage in this activity. In contrast to our hypothesis that more frequent use of home transitional spaces, such as windows, would yield improved health outcomes, when individuals in Chieti reported more frequent window viewing, they also reported greater loneliness than those who did not frequently look out their windows alone, suggesting that window viewing may be an activity that individuals engage in when feeling lonely. For individuals in Boston, health outcome measures did not differ based on reported window viewing. Finally, changes after COVID-19 were minimal, where use of outdoor space remained consistent across periods of the pandemic. Only in Boston did individuals report greater time indoors since the onset of the pandemic.

Outdoor transitional spaces

The stereotypical individualism of the United States (Oyserman, 2002) is consistent with our finding that the Boston cohort would report more individualistic use of outdoor transitional spaces, including public and private areas, than the Chieti cohort. In characterizing their living arrangement, more individuals in Boston indicated living alone, whereas in Chieti most indicated living with someone else. The United States is known for patterns of household composition or living arrangements that are more individualistically oriented (Ruggles, 2015), whereas demographers have referred to an ongoing process of individualization in Europe (De Jong Gierveld & Van Tilburg, 1999) alongside a change in household composition that includes fewer people living in one home (Tomassini et al., 2004). Although these trends vary differently by country, Italy remains oriented more strongly toward traditional family patterns, in which older adults coresiding with their adult children is observed more often than in northwestern Europe (e.g., the Netherlands, the United Kingdom), where there is a stronger individualistic culture (De Jong Gierveld & Van Tilburg, 1999; Tomassini et al., 2004). This cultural typology may extend beyond the home and into transitional home and community spaces, possibly accounting for the differences in use of the transitional spaces described in this study.

Another possibility is to consider the characteristics of the Chieti sample, mainly significantly lower MoCA scores ($N = 30$, 58.8%), which may also contribute to the number of people living with others ($N = 38$, 74.51%). Moreover, the type and location of dwelling units in Chieti, which has an uneven terrain versus Boston, which is relatively flat, might make it less accessible for individuals with disabilities and thus contribute to the need to live with others (*Free topographic maps, elevation, terrain*, n.d.).

In this particular sample of older adults, the outdoor transitional spaces that were indicated as most frequently used were found to be private in some way (e.g., balcony, back porch, back yard, etc.), in contrast to semiprivate areas (e.g., front yard). In accordance with prior research, access from semiprivate zones allows one to seeing others while not being seen (Abd-Alhamid, 2023). However, other research suggests that semiprivate zones can also provide higher levels of perceived social support due to features such as porches

that increase face-to-face interactions, whereas windows remove this in-person proximity (Leccese & McCormick, 2000). While we did not find this to be the case in the current sample, it is possible that during the pandemic there was a desire for social connection while not being in close proximity to others.

Indoor transitional spaces and window viewing

Although the availability of community transitional spaces (e.g., parks, outdoor seating) and livable outdoor spaces (e.g., porches, balconies) might vary based on socioeconomic status and geographic location, windows are features found nearly universally. Importantly, these household transitional spaces allow for sufficient natural light, ventilation, and building code safety in terms of required exits from bedrooms in the event of fire or other emergency. Prior research has demonstrated the importance of window views, whereby home nature window views reduced levels of depression, loneliness, and anxiety—sometimes more than the physical use of greenspace itself (Soga, 2021). Dempsey et al. (2018) found that mental health benefits (i.e., reduced depression scores) for older adults occurred more from the visual aspects of views incorporating natural water elements, rather than from physical proximity. In our sample, almost all of both groups reported having a window that they look out from within the room they frequent the most in the home.

In their assessment of the housing environment and mental health during the pandemic, Amerio et al. (2020) distinguished between a green view and the quality of view separately. Their study found a strong relationship between a poor-quality view and depressive symptoms. Our study described here noted subjective window views (the presence of green trees), whereas subjective quality of views was not evaluated and may be an important area for future study. Additional research is needed to determine whether views that do not include natural elements (e.g., man-made features) differ in their effect in terms of whether they include human presence or not (e.g., viewing a busy street, or activities such as a playground).

Country-specific data regarding living arrangement for older adults show that household composition is an important determinant of loneliness. De Jong Gierveld and Van Tilburg (1999) found less loneliness in Italy, where older people are more often living with others, when compared to the Netherlands. Interestingly, despite the majority of the Chieti sample reporting living with others, the sample was more isolated than the participants in Boston. Prior research has noted that loneliness can occur even with others in close proximity, even within the same dwelling unit (Hsu, 2020). While individuals in Chieti reported less frequently aided hearing and vision than Boston, this could also mean that there were untreated sensory impairments, which is associated with increased loneliness (Brunes, 2019; Ramage-Morin, 2016). In our study, individuals in Chieti who reported greater loneliness also reported more frequent window viewing, suggesting that window viewing may be an activity that individuals engage in when feeling lonely.

Another possibility for the loneliness findings in this group could relate to seeing the homes of friends and neighbors, but not necessarily seeing the people themselves, especially during pandemic lockdowns. However, recent research suggests that during COVID-19 older people began to use balconies in new ways to promote socialization within their own homes via

the ability to communicate with isolated surroundings, observing cultural performances, and enjoying the company of others (Beşir Ertaş et al., 2022).

Kowitt et al. (2020) found that for older adults living with chronic conditions in a rural setting, a better perceived neighborhood environment was associated with less loneliness, while a less favorable neighborhood context was associated with reported symptoms of depression through loneliness, physical activity, and perceived individual control. Therefore, in our study, these results could also represent a bias whereby those who look out the window to what might be perceived as a poor-quality or depressed neighborhood environment (e.g., run-down, unsafe surroundings etc.) may feel more lonely.

Impact of COVID-19 on home and community space use

The results of our study found some differences in the use of transitional spaces during the pandemic. While it was anticipated that an increase in use of transitional spaces would be seen in both groups, there was no change in space use for those in Chieti. In comparison, more Boston participants did report a change in their use of indoor space, notably spending more time in these spaces. This is consistent with some prior U.S. research—a study of breast cancer patients during the pandemic found that while activities in public green spaces significantly decreased, time in the home on the porch or in the backyard significantly increased. In addition, indoor activities that involved passive contact with nature, such as bird-watching from windows, also increased (Pearson, 2021).

One possibility to account for the lack of change in space use during the pandemic seen in the Chieti group could be related to housing characteristics—in 2018, 28.8% of the Italian population (16.8 million) lived in overcrowded apartments. The average apartment size in Italy is 117 square meters, with the crowding index nationwide showing that 20.7% of the apartments with more than 4 people measured less than 80 square meters, and one-third of these Italian homes do not have a balcony, with only 8% constructed in the 21st century (Signorelli, 2020). While single-family homes with gardens, wider spaces, and balconies with good-quality views are more often seen in the suburbs of the United States, Signorelli (2020) notes that the metropolitan cities of Italy (both downtown and residential areas) include apartment buildings, likely due to the cost of land and the architectural philosophy. It is possible that these space characteristics make it more difficult to alter usage of home space.

Although the time differentiation was not at the true start and end of the pandemic, mid pandemic 2021 was generally not as strict in terms of lockdown policies as the start of COVID-19 in 2020 (although this varied considerably by region). Moreover, the 2022 omicron variant caused a revisit of early strict pandemic policies for many. In terms of a comparison between groups based on outdoor space use and window viewing, amount of time spent alone pre and post pandemic was not measured, and it is possible that time alone or with others can impact use of community spaces and how indoor transitional spaces are used by older adults.

Limitations

There were several limitations to this study. It is possible that different cultures may interpret the responses to the same questions differently. In terms of timing, because surveys were administered over a number of months during the pandemic where lockdown rules differed, it is possible that behaviors changed over time and accounted for some of the results seen (e.g., the majority indicating no change in use of transitional spaces). While results of our study found some differences in the use of transitional spaces during the pandemic, it would have been interesting to obtain data around space use prior to the pandemic. Data were also collected over several seasons which might impact use of outdoor space and change the quality of green views from windows during colder months.

Other potential limitations include the fact that the TSS survey tool was developed in the context of this study and used for the first time, and window characteristics (such as size and location, which are relevant to views) were not included in the survey. While frequency of activities individuals engaged in while in this space with windows was asked, specific activities undertaken while window viewing (e.g., knitting, observing the view, etc.) were not assessed, and this could be undertaken in the future to better understand window viewing behavior. The TSS did not address the type of view and the reasons individuals chose to use rooms with windows, such as for views or just the natural light. In addition, there was a lack of comparative data for window views pre and post pandemic. Given the importance of window viewing, it would have been useful to specifically ask participants what they could see out the windows, how frequently they looked out windows, and the reasons they chose to use rooms with windows (e.g., such as for views or just the natural light). There was also a lack of comparative data for window views pre and post COVID, and quality of views may be of greater importance than quantity of views.

Regarding further descriptors, socioeconomic status was not collected, and this has been shown in past studies to factor into access and use of green infrastructure (Heckert & Bristowe, 2021). In addition, use of public space could have been expanded via qualitative methods. Because this study consisted of a large metropolitan city in the United States and a smaller city in Italy, it may be that the health outcome differences observed are due to comparing a metropolitan versus a smaller city, rather than being due to national differences. Comparisons between different-sized cities and towns within the same country could be a future area of exploration. Although our study captures typologies of outdoor transitional spaces, lack of use of transitional spaces may be due to individual preference or design characteristics. This delineation could be explored further in subsequent research.

Conclusion

Prior research has noted a general lack of individual green space characteristics (Van den Berg et al., 2015; Akpinar, 2016), and while this study provides important information regarding transitional space use by older adults, further study of types and characteristics of public outdoor spaces is needed. In addition, including qualitative methodology to obtain built environment information is recommended for future consideration.

Identifying transitional space design features, as well as how individuals use them, is important in understanding the effect of the built environment on mental and social health. This cross-cultural descriptive study provides important information regarding characteristics of community and residential transitional space access and use. The results from this research will require further exploration to better understand the impacts of transitional spaces on mental and social health outcomes. Further understanding of transitional space use in and around the home is important given the potential to inform design guidelines and building standards.

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Appendix 1: Transitional Spaces Survey

PART I I am going to ask you some questions about your community and home where you live.

1. What types of public outdoor spaces are accessible to you within your community? I will read a list of spaces and you can select as many that apply:

Community garden

Park or green space

Beach or sea

Lake, river, or pond

Forest

Outdoor plaza

Other (please name the space)

2. How do you get to these public outdoor spaces?

Walk

Drive myself

Driven by someone else or take a taxi

Bicycle

Public transportation

Other

3. What types of private or semiprivate outdoor spaces are accessible to you from your home? I will read a list of spaces and you can select as many that apply:

   Front yard

   Back yard

   Front porch

   Back porch

   Patio

   Shared courtyard

   Balcony

   Other (please name the space)

4. Do you spend time in any of these private or semiprivate outdoor spaces? Yes/No If no, then proceed to Part II. If yes, proceed to Question 5.

5. Which of these outdoor spaces do you use the most? Please choose one:

   (Read the list of selected spaces from question 3 including “other” spaces identified by participant) Now, I will ask you some questions about the outdoor space which you use the most.

6. What is the nature of this outdoor space? Private/Not private

7. How would you describe the size of this outdoor space?

   Less than 400 square feet (smaller than a two-car garage)

   Approximately 400 square feet (similar in size to a two-car garage)

   Bigger than 400 square feet (bigger than a two-car garage)

8. a. Can you see any trees when you are in this outdoor space? Yes/No

      If yes, approximately how many trees can you see? (Prompt: please give your best guess)

9. Before COVID-19 began, how often would you use this outdoor space by yourself?

   More than once a day/once a day/weekly/monthly/every few months/yearly/never

10. Before COVID-19 began, how often would you use this outdoor space with others?

    More than once a day/once a day/weekly/monthly/every few months/yearly/never

11. Before COVID-19 began and assuming pleasant weather, I will ask you about the types of activities you would do while in this outdoor space and how much time you would spend on each.

a. When in this outdoor space, would you spend time reading? Yes/No

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hours

b. When in this outdoor space, would you spend time sitting and watching outside? Yes/No

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hours

c. When in this outdoor space, would you spend time talking to neighbors in person? Yes/No

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hours

d. When in this outdoor space, would you spend time talking to family members in person? Yes/No

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hours

e. When in this outdoor space, would you spend time talking on a phone? Yes/No

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hoursf. When in this outdoor space, would you spend time using a mobile device (for example, a cell phone, tablet, or laptop computer)? Yes/No

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hours

f. Are there other activities not mentioned that you would spend time doing while in this outdoor space? Yes/No

If yes, what are they?

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hours

(If more than one additional activity is mentioned, please ask how much time is spent for each one)

12. How much do you enjoy using this outdoor space?

1(*Not at all*) 2 3 4 5 (*Very much*)

13. What things do you enjoy about being in this outdoor space?

14. What things do you not enjoy about being in this outdoor space?

15. Do you spend more, less or the same amount of time in this outdoor space since COVID-19 began? More time/less time/same amount of time

16. a. Do you use this outdoor space differently now during COVID-19? Yes/No

    b. Are there different activities that you spend time doing while in this outdoor space since COVID-19 began? Yes/No (If no, proceed to Part II)

    If yes, what are they?

    If yes, approximately how much time do you spend on this activity in an average week?

    Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/over 6 hours

    (If more than one additional activity is mentioned, please ask how much time is spent for each one.)

PART II Now, I am going to ask you some questions about the inside of your home.

17. Which room do you spend the most time in during the day?

    Kitchen

    Dining room

    Living room

    Family room

    Bedroom

    Office

    Other (please name the space)

18. a. Are there any windows that you look out from when in this room? Yes/No

    If yes, please proceed. If no, survey is complete.

    b. If yes, how many?

19. What time of day do you get the most sunlight into this room?

    Early morning

    Midday

Late afternoon

Now, I will ask you some more questions about the window which you look out from the most often when in this room.

17. Is there a place to sit in front of the window? Yes/No

18.
- **a.** Can you see any trees when you look out from the window? Yes/No
- **b.** If yes, then approximately how many trees can you see? (Prompt: please give your best guess)

19.
- **a.** Are you able to open the window? Yes/No
- **b.** If yes, how often do you have the window open? More than once a day/once a day/weekly/monthly/every few months/yearly/never

20.
- **a.** Do you have curtains or blinds on the window? Yes/No
- **b.** Are they mostly open or closed during the day? Open/Closed
- **c.** If mostly closed, then why?

21. Which best describes the view from your window?

Brick wall or another building

Playground, schoolyard, park or other public setting

Sidewalk and street

Driveway

Yard or garden

City view

Other? Yes/No If yes, please describe

22. Before COVID-19 began, how often would you look out from your window by yourself?

Never (1), rarely (2), occasionally (3), frequently (4), most of the day (5)

Approximately how many times a day would you look out of the window?

(Prompt: please give your best guess)

23. Before COVID-19 began, how often would you look out from your window with others?

Never (1), rarely (2), occasionally (3), frequently (4), most of the day (5)

Approximately how many times a day would you look out of the window with others?

(Prompt: please give your best guess)

24. Now, I will ask you about the types of activities you would do before COVID-19 began while in this room with a window and how much time you would spend on each.

a. When in this outdoor space, would you spend time reading? Yes/No

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hours

b. When in this outdoor space, would you spend time sitting and watching outside? Yes/No

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hours

c. When in this outdoor space, would you spend time talking to neighbors in person? Yes/No

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hours

d. When in this outdoor space, would you spend time talking to family members in person? Yes/No

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hours

e. When in this outdoor space, would you spend time talking on a phone? Yes/No

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hoursf. When in this outdoor space, would you spend time using a mobile device (for example, a cell phone, tablet, or laptop computer)? Yes/No

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hoursg. Are there other activities not mentioned that you would spend time doing while in this outdoor space? Yes/No

If yes, what are they?

If yes, approximately how much time would you spend on this activity in an average week? Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/ over 6 hours

(If more than one additional activity is mentioned, please ask how much time is spent for each one.)

25. How much do you enjoy using this outdoor space?

    1(*Not at all*) 2 3 4 5 (*Very much*)

26. What things do you enjoy about being in this room with a window?

27. What things do you not enjoy about being in this room with a window?

28. Do you use this room with a window differently now during COVID-19? Yes/No

29. Do you spend more, less or the same amount of time in this room with a window since COVID-19 began? More time/less time/same amount of time

30. Are there other activities not mentioned that you spend time doing while in this room with a window since COVID-19 began? Yes/No If yes, what are they?

    If yes, approximately how much time do you spend on this activity in an average week?

    Less than 1 hour/1–2 hours/2–4 hours/4–6 hours/over 6 hours

    (If more than one additional activity is mentioned, please ask how much time is spent for each one.)

Thank you for answering these questions about your home environment.

Appendix 2: Perceived Risk Scale

For the following survey, please rate your response from a score of 0 to 10:

1. How likely do you think it is that you might become infected with COVID-19 in the near future?

2. How likely do you think it is that people in your family and friends might become infected with COVID-19?

3. How likely do you think it is to get COVID-19 in general?

4. How likely do you think it is that you might become seriously ill due to COVID-19 in the near future?

5. How likely do you think it is that you might become ill due to another common serious condition in the near future (e.g., heart disease, stroke, cancer)?

6. How likely do you think it is that people in your family and friends might become ill due to a common serious condition in the near future (e.g., heart disease, stroke, cancer)?

7. How likely do you think it is to become ill due to a common serious condition in general (e.g., heart disease, stroke, cancer)?

8. How likely do you think it is that you might become seriously ill due to a common serious condition in the near future (e.g., heart disease, stroke, cancer)?

9. How worried would you be about going to the hospital right now given the current COVID-19 pandemic?

10. How likely do you think it is that you might become financially affected by the COVID-19 pandemic in the near future?
11. How likely do you think it is that people in your family and friends might become financially affected by the COVID-19 pandemic in the near future?
12. How emotionally affected are you now by the COVID-19 pandemic?
13. How likely do you think it is that you might become emotionally affected by the COVID-19 pandemic in the near future?

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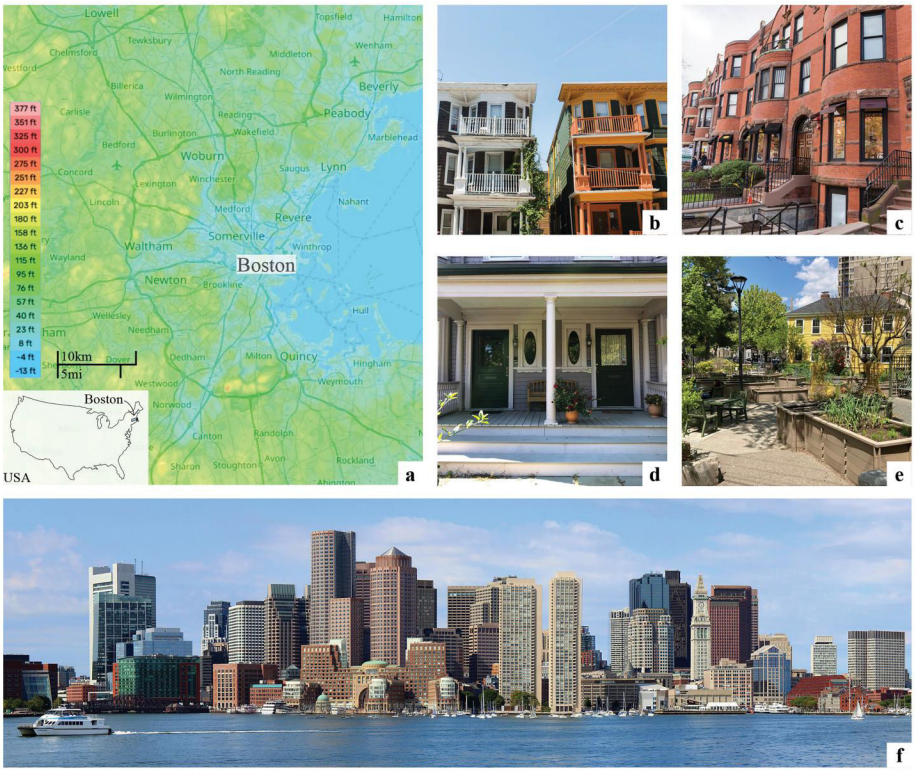

Figure 1.

Geographic overview and transitional space examples in Boston, Massachusetts, USA. a. Key map and topography of Boston and surrounding region. (Free topographic maps: Boston, n.d.). b. Multi-unit housing (Acitelli, 2020a). c. Historic Boston townhomes (Acitelli, 2020b). d. Shared residential front porch (own photo). e. Community garden (Costa Lopez park in Cambridge MA, n.d.). f. Boston city skyline (Wikipedia Contributors: Boston, 2019).

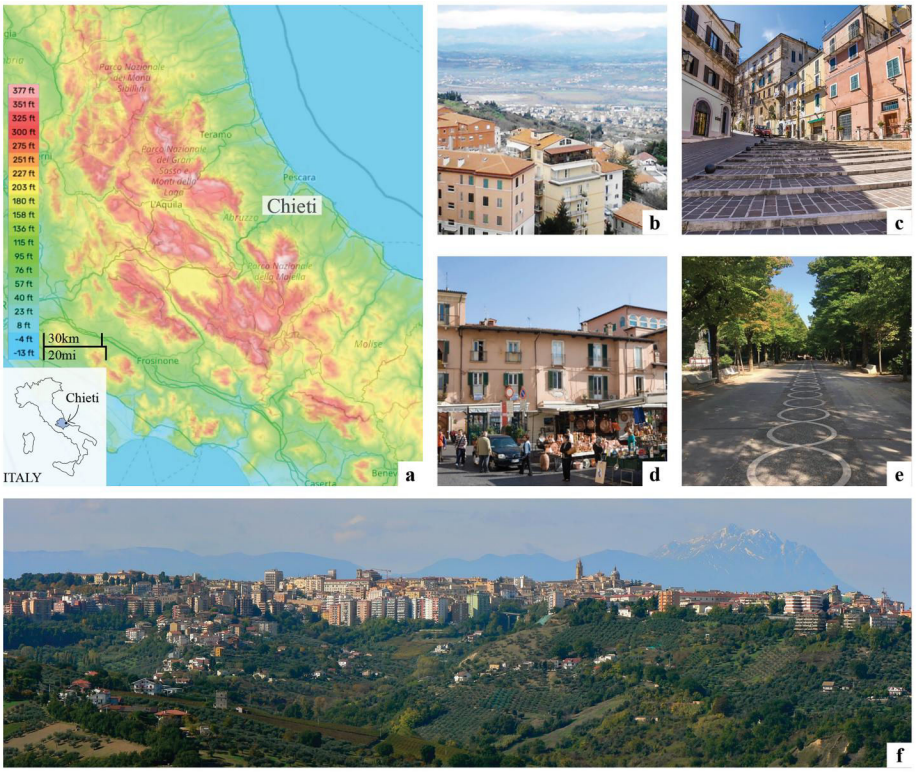

Figure 2.

Geographic overview and transitional space examples in Chieti, Italy.

a. Key map and topography of Chieti and surrounding region (Free topographic maps: Chieti, n.d.). b. Views from up the hill in Chieti (Chieti, Italy—A great destination in Abruzzo, n.d.). c. Chieti city center (Chieti Travel Guide—Italy, n.d.). d. Green park, Villa Comunale (Commune di Chieti, n.d.). e. Abruzzo region market (Alamy Limited, n.d.). f. Chieti city skyline (Chieti, 2022).

Table 1.

Participant demographics.

Characteristics	Boston, *N* = 40	Chieti, *N* = 51	Total, *N* = 91	Test statistic	*p*	Effect size *d*
	M (*SD*)	M (*SD*)	M (*SD*)			
Age	77.4 *(7.00)*	74.8 *(7.15)*	75.95 *(7.16)*	*t*(89) = 1.74	.086	.37
	62–95 years	65–88 years				
Education (years)	17.15 *(2.49)*	11.25 *(4.91)*	13.85 *(4.97)*	*t*(77.5) = 7.45	<.001	1.46
Blind MoCA	19.78 *(3.39)*	16.44 *(3.24)*	17.86 *(3.71)*	*t*(82) = 4.87	<.001	1.03
Number of people (<18)	8	30	38			
	N (%)	*N* (%)	*N* (%)			
Gender				$\chi^2(1)$ =4.86	.027	
Male	25 (62.5)	20 (39.2)	45 (49.5)			
Female	15 (37.5)	31 (60.7)	46 (50.5)			
Marital status	*n* = 38	*n* = 14	*n* = 52	$\chi^2(1)$ = 1.47	.225	
Married	23 (60.5)	11 (78.6)	34 (63.4)			
Single/divorced	15 (39.5)	3 (21.4)	18 (34.6)			
Employment				$\chi^2(1)$ = .114	.736	
Employed	6 (15)	9 (11.7)	15 (16.5)			
Unemployed[a]	34 (85)	42 (82.4)	76 (83.5)			
Independence[b]						
Mobility	33 (82.5)	45 (88.24)	78 (85.71)	$\chi^2(1)$ = .602	.438	
Hearing	31 (77.5)	49 (96.08)	80 (87.91)	$\chi^2(1)$ = 10.18	.001	
Vision	13 (32.5)	24 (47.1)	37 (40.7)	$\chi^2(1)$ =7.20	.007	
Residence				$\chi^2(1)$ = -63	.428	
House	29 (72.5)	33 (64.7)	62 (68.1)			
Apartment	11(27.5)	18 (35.3)	29 (31.9)			
Living situation				$\chi^2(1)$ = 16.06	<.001	
Alone	27 (67.5)	13 (25.49)	40 (43.96)			
With someone	13 (32.5)	38 (74.51)	51 (56.04)			
Outcome measures						

Characteristics	Boston, *N* = 40	Chieti, *N* = 51	Total, *N* = 91	Test statistic	*p*	Effect size *d*
GDS						
Percent with clinical	2.40 (± 1.79)	4.71 (± 3.31)	3.69 (± 2.97)	$t(80.12) = 4.25$	<.001	0.84
depression	5 (12.5%)	20 (39.22%)	25 (27.47%)			
GAI						
Percent with clinically	1.95 (± 3.01)	6.45 (± 4.78)	4.47 (± 4.66)	$t(85.39) = 5.48$	<.001	1.1
significant anxiety	1 (2.5%)	15 (29.41%)	16 (17.58%)			
Lubben						
Percent at risk for social isolation	21.28 (± 6.07) 2 (5%)	15.80 (± 3.61) 7 (13.73%)	18.21 (±5.54) 9 (7.69%)	$t(60.06) = 5.05$	<.001	1.13
UCLA	34.08 (± 8.48)	43.35 (± 9.16)	39.39 (± 9.96)	$t(82.94) = 4.93$	<.001	1.04
Percent at risk for severe loneliness	4 (10%)	11 (21.6%)	15 (16.5%)			
Perceived Risk Scale	25.24 (± 11.31)	67 (± 20.15)	46.17 (± 26.76)	$t(81.54) = 12.41$	<.001	2.46

Note. Blind Montreal Cognitive Assessment (MoCA), Geriatric Depression Scale (GDS), Geriatric Anxiety Inventory (GAI), Lubben Social Isolation (Lubben), University of California Los Angeles Loneliness Index (UCLA).

[a]Unemployed includes retired.

[b]independence indicates participants without functional limitations: mobility (no canes, walkers, or wheelchairs), hearing (no use of hearing aids), vision (no reported vision difficulties).

Table 2.

Public and private outdoor transitional spaces.

	Boston	Chieti	Total	Test statistic	*p*
Public outdoor spaces	4.0 (±1.91)	2.2 (±0.96)	3.0 (±1.71)	$t(54.42) = 5.46$	< .001
	N(%)	*N*(%)	*N*(%)	Percentages not cumulative since multiple answers were allowed	
Park or green space	33 (82.5)	37 (72.5)	70 (76.9)		
Outdoor plaza	13 (32.5)	4 (7.8)	16 (18.7)		
Beach or sea	19(47.5)	12 (23.5)	31 (34.1)		
Community garden	12 (30)	5 (9.8)	17 (18.7)		
Lake or river	25 (62.5)	2 (3.9)	27 (29.7)		
Forest	21 (52.5)	3 (5.9)	24 (26.4)		
Other	13 (32.5)	4 (7.8)	17 (18.7)		
Transportation					
Walk	17 (42.5)	42 (82.4)	59 (64.8)		
Drive	21 (52.5)	36 (70.6)	57 (62.6)		
Other	0	2 (3.9)	2 (2.2)		
Private outdoor spaces	3.3 (±1.52)	2.6 (±1.49)	2.9 (±1.54)	$t(82.87) = 2.37$	.020
	N(%)	*N*(%)	*N*(%)	Percentages not cumulative since multiple answers were allowed	
Front yard	26 (65)	24 (47.1)	50 (54.9)		
Back yard	29(72.5)	25 (49)	54 (59.3)		
Balcony	9 (22.5)	36 (70.6)	45 (49.5)		
Front porch	12 (30)	7 (13.7)	19 (20.9)		
Back porch	14 (35)	18 (35.3)	32 (35.2)		
Patio	15 (37.5)	11 (21.6)	26 (19.8)		
Courtyard	9 (22.5)	9 (17.6)	18 (19.8)		
Other	14 (35)	1 (1.9)	15 (16.5)		
Total outdoor spaces	7.3 (± 2.40)	4.8 (± 1.90)	5.9 (± 2.48)	$t(73) = 5.23$	<.001
Time spent in outdoor spaces?	Yes: 37 (92.5)	Yes: 43 (84.3)	Yes: 80 (87.9)	$\chi^2(1) = 1.41$	.234
	No: 3 (7.5)	No: 8 (15.7)	No: 11 (12.1)		

Table 3

Characteristics of most used outdoor transitional space.

Characteristics	Boston, *N* = 37	Chieti, *N* = 43	Total, *N* = 80	Test statistic	*p*
Most used outdoor space	*N* (%)	*N* (%)	*N* (%)		
Front yard	3 (8.1)	8 (18.6)	11 (13.8)		
Back yard	10 (27)	9 (20.9)	19 (23.8)		
Balcony	4 (10.8)	11 (25.6)	15 (18.8)		
Front porch	4 (10.8)	0	4 (5)		
Back porch	3 (8.1)	5 (11.6)	8 (10)		
Patio	6 (16.2)	0	6 (7.5)		
Courtyard	3 (8.1)	3 (7)	6 (6.6)		
Other: garden	4 (10.8)	7 (16.3)	11 (12.1)		
Type of space	Private: 31 (83.8)	Private: 41 (95.3)	Private: 72 (90)	$\chi^2(2) = 4.40$	.111
	Semipublic: 6 (16.2)	Semipublic: 2 (4.7)	Semipublic: 8 (10)		
Size of space	>400 square feet:	>400 square feet:	>400 square feet:	$\chi^2(2) = .225$	.894
	17 (45.9)	22 (51.2)	39 (48.8)		
	Approx. 400 square feet: 5 (13.5)	Approx. 400 square feet: 5 (11.6)	Approx. 400 square feet: 10 (12.5)		
	<400 square feet:	<400 square feet:	<400 square feet:		
	15 (40.5)	16 (37.2)	31 (38.8)		
Trees present	Yes: 36 (97.3)	Yes: 36 (83.7)	Yes: 72 (90)	$\chi^2(2) = 5.52$	.063
	No: 1 (2.7)	No: 7 (16.3)	No: 8 (10)		
Activities in space					
Reading	23 (62.2)	59 (51.2)	45 (56.3)		
Sitting/watching outside	31 (83.9)	32 (74.4)	63 (78.8)		
Talking to neighbors	15 (40.5)	34 (79.1)	49 (61.3)		
Talking to family	25 (67.6)	37 (86.04)	62 (77.5)		
Talking on the phone	18 (48.6)	23 (54.5)	41 (51.3)		
Using a mobile device	16 (43.2)	16 (37.2)	32 (40)		
Other	20 (54.1)	16 (37.2)	36 (45)		
Usage of outdoor space Alone:	*n* = 37	*n* = 43	*n* = 80		
Frequently	34 (91.9)	40 (93)	74 (92.5)	$\chi^2(2) = 1.45$	.484

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Characteristics	Boston, *N* = 37	Chieti, *N* = 43	Total, *N* = 80	Test statistic	*p*
Infrequently	3 (8.1)	3(7)	6 (7.5)		
With others:					
Frequently	22 (59.5)	37 (86.1)	59 (73.8)	$\chi^2(2) = 8.74$	.013
Infrequently	15 (40.5)	6(14)	21 (26.3)		
	M (SD)	*M* (SD)	*M* (SD)		
Enjoyment level[a]	4.5 (0.85)	4.3 (1.07)	4.4 (0.98)	f(74.9) = 1.18	.243

[a]Enjoyment level by Likert scale: 1 *(not at all)* to 5 (very *much).*

Table 4

Characteristics of most used indoor transitional space.

	Boston, *N* (%)	Chieti, *N* (%)	Total, *N* (%)	Test statistic	*p*
Most used room					
Kitchen	10 (25)	10 (19.6)	20 (22)		
Office	2 (5)	1 (2)	3 (3.3)		
Family room	4 (10)	11 (21.6)	15 (16.5)		
Living room	15 (37.5)	5 (11.8)	20 (23.1)		
Dining room	1 (2.5)	1 (2)	2 (2.2)		
Bedroom	2 (7.5)	3 (5.9)	6 (6.6)		
Other	4 (10)	1 (2)	5 (5.5)		
Windows	Yes: 39 (97.5)	Yes: 44 (86.3)	Yes: 83 (91.2)	$\chi^2(1) = 3.52$	.061
Windows, number	No: 1 (2.5)	No: 7 (13.7)	No: 8 (8.7)	$t(42.4) = 4.01$	< .001
	M (SD)	*M* (SD)	*M* (SD)		
	4.1 (3.52)	1.7 (0.90)	2.8 (2.75)		
Time with most light	*N* (%)	*N* (%)	*N* (%)	$\chi^2(2) = 8.74$	.013
Morning	20 (51.3)	17 (38.6)	37 (44.6)		
Midday	10 (25.6)	24 (54.5)	34 (41)		
Afternoon	9 (23.1)	4 (6.8)	12 (14.5)		
Place to sit in front of window	Yes: 27 (69.2)	Yes: 35 (79.5)	Yes: 62 (74.7)	$\chi^2(2) = 4.7$	.095
	No: 12 (30.8)	No: 9 (20.5)	No: 21 (25.3)		
Trees	38 (97.4)	36 (81.8)	74 (89.2)	$\chi^2(2) = 8.80$	.012
Window features					
Operable window	Yes: 35 (89.7)	Yes: 44 (100)	Yes: 79 (95.2)	$\chi^2(2) = 8.32$	.016
	No: 4 (10.3)	No: 0	No: 4 (4.8)		
Window covering	Yes: 31 (79.5)	Yes: 40 (88.6)	Yes: 70 (84.3)	$\chi^2(2) = 4.85$	.089
Window open/closed	No: 8 (20.5)	No: 5 (11.4)	No: 13 (15.7)	$\chi^2(2) = 14.05$	.001
	Open: 21 (67.8)	Open: 43 (95.6)	Open: 64 (84.2)		
	Closed: 10 (32.3)	Closed: 1 (2.3)	Closed: 11 (14.5)		
Window view					
Brick wall/building	2 (5.1)	8 (18.2)	10 (12.1)		
Playground/park	1 (2.6)	5 (11.4)	6 (7.2)		
Sidewalk/street	3 (7.7)	3 (6.8)	6 (7.2)		
Driveway	0 (0)	1 (2.3)	1 (1.2)		
Yard/garden	18 (46.2)	24 (54.5)	42 (50.6)		
City	3 (7.7)	2 (4.5)	5 (6.1)		
Other	12 (30.8)	1 (2.3)	13 (15.5)		
Activities					
Reading	29 (74.4)	34 (61.4)	56 (67.5)		
Sitting/watching	31 (79.5)	31 (70.5)	62 (74.7)		
Talking to neighbors	26 (66.7)	32 (72.7)	58 (69.9)		

	Boston, *N* (%)	Chieti, *N* (%)	Total, *N* (%)	Test statistic	*p*
Talking to family	22 (56.4)	38 (86.4)	60 (72.3)		
Talking on phone	33 (84.6)	34 (77.3)	67 (80.7)		
Using mobile device	27 (69.2)	23 (52.3)	50 (60.2)		
Other	21 (53.8)	7 (15.9)	28 (33.7)		
Indoor window use	*n* = 39	*n* = 43	*n* = 82		
Alone:					
Frequently	29 (74.4)	20 (44.4)	49 (58.3)	$\chi^2(1) = 9.90$	.002
Infrequently	9 (33.3)	29 (64.4)	38 (46.4)		
With others:					
Frequently	8 (20.5)	7 (15.6)	15 (17.9)	$\chi^2(1) = .296$	.586
Infrequently	31 (79.5)	37 (82.2)	68 (80.9)		
	M (SD)	*M* (SD)	*M* (SD)		
Enjoyment level[a]	4.2 *(1.12)*	4.8 *(0.39)*	4.4 *(1.02)*	$t(37.7) = 1.77$	.084

[a]Enjoyment level by Likert scale: 1 (*not at all)* to 5 (*very much*).

Table 5.

Transitional space use since COVID-19.

	Boston, *N* (%)	**Chieti, *N* (%)**	**Total, *N* (%)**	**Test statistic**	***p***
Outdoor space time since COVID				$\chi^2(3) = 5.3$	.151
More time	6 (16.2)	13 (30.2)	19 (23.8)		
Less time	12 (32.4)	7 (16.3)	19 (23.8)		
Same time	19 (51.4)	23 (53.5)	42 (52.5)		
Outdoor space used	Yes: 7 (18.9)	Yes: 12 (27.9)	Yes: 19 (23.8)	$\chi^2(2) = 2.31$	.315
differently since COVID	No: 30 (81.1)	No: 31 (72.1)	No: 61 (76.3)		
Different activities outdoors	Yes: 1 (2.7)	Yes: 13 (30.2)	Yes: 14 (17.5)	$\chi^2(2) = 10.83$	.004
since COVID	No: 35 (95)	No: 30 (69.8)	No: 65 (81.3)		
Indoor room used differently	Yes: 9 (23.1)	Yes: 2 (4.4)	Yes: 11 (13.1)	$\chi^2(2) = 9.77$	.008
since COVID	No: 30 (76.9)	No: 42 (93.3)	No: 72 (85.7)		
Indoor space time since COVID				$\chi^2(3) = 14.84$	.002
More time	18 (46.2)	9 (20)	27 (33)		
Less time	3 (7.7)	0	3 (3.6)		
Same time	18 (46.2)	35 (77.7)	53 (65.1)		
Different activities indoors	Yes: 7 (17.9)	Yes: 0	Yes: 7 (8.5)	$\chi^2(2) = 12.92$	.002
since COVID	No: 32 (82.1)	No: 43 (100)	No: 75 (91.5)		